A RELIEF INVERSION IN THE SUBCARPATHIANS OF IALOMIŢA
THE ANTICLINE OF VĂŞCEA, A DOME LAID BARE BY EROSION

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Résumé: Une inversion de relief dans les Souscarpates de Ialomiţa – la boutonnière Văşcea. Connaître le relief structurel et pétrographique a, hormis son importance intrinsèque, surtout pour les unités de relief des Souscarpates, une importance particulière, avec des implications morphogénétiques dans la détermination de l’étape évolutionnelle du relief. Ainsi, le relief structurel ne tient pas compte, dans un premier temps, de la pétrographie de la zone – les régions surélévées par les mouvements tectoniques peuvent se greffer à la fois sur des roches dures et sur des roches friables. Graduellement, au fur et à mesure que l’érosion subaérienne commence et ensuite se développe après que la région a été surélevée, la pétrographie commence à imposer son influence au détriment des éléments structurels. De cette manière, il y aura des inversions de relief – les régions hautes (collines) resteront ainsi seulement si elles sont axées sur des vallées dures, et en même temps les vallées et les alignements suivront petit à petit le cours des alignements formés de roches plus molles, même dans le cas où celles-ci avaient occupé une position plus haute, initialement. Voilà donc l’importance cruciale de l’étude – aussi détaillée que possible – du relief structurel et pétrographique dans une région des collines péricarpatiques, plus précisément de la relation relief structurel/relief pétrographique et implicitement de la relation relief concordant/relief discordant. Notre conclusion serait que le nombre des inversions de relief est directement proportionnel à l’étape évolutionnaire, c’est-à-dire un grand nombre d’inversions signifie une étape évolutionnaire avancée de la région.

Key words: relief inversion, structural relief, the Subcarpathians of Ialomiţa

1. Introduction
Knowing the structural and the petrographic relief, beside its intrinsic importance, has, especially for the Subcarpathian relief units, a particular importance, with morphogenetic implications in the determination of the relief’s evolutionary stage. So, initially, structural relief does not heed the petrography of the area – the regions uplifted by tectonics can be grafted both on tough rock and on friable rock. Gradually, as subaerial erosion begins and then develops after the region has been uplifted, petrography begins to impose its influence at the expense of the structural elements. So, relief inversions will appear – the high regions (the hills) will remain so only if they are axed on tough valleys, while the valleys and the alignments will gradually follow the alignments made up of softer rocks, even though these may have occupied a higher setting, initially. This is therefore the crucial importance of the study – as detailed as possible – of the structural and petrographic relief in a region of Subcarpathian Hills, more exactly of the relation structural relief / petrographic relief and implicitly of the relation concordant relief / structural inversion relief. We could conclude that the number of relief inversions is directly proportional to the evolutionary stage, namely, a large number of inversions signifies an advanced evolutionary stage of the region.

From this viewpoint, the Subcarpathians of Buzău are known as possessing the highest number of relief inversions in the Curvature Subcarpathians. At the same time, the geomorphological literature quotes several relief inversions, though less numerous, for the Subcarpathians of Vrancea, too. On the contrary, in the Subcarpathians of Prahova, no such form of structural relief of inverse concordance is mentioned. The conclusion that one could possibly draw would be that the Subcarpathians of Prahova are the least evolved or, in other words, are in an incipient (initial) evolutionary stage, or the youngest. It is but an error noted in
the specializes literature, through the omission of the examples of such a relief, consequence of a mistaken approach in the structural and petrographic geomorphology – the habit of studies from the office, using maps with a high degree of generalization, with lower scales than 1:200,000. The least effort of studying in detail, out in the field, and with the most detailed topographic and geological maps (scales of respectively 1:25,000 and 1:50,000), highlights a totally different conclusion: the Subcarpathians of Prahova are very rich in forms of inversion. Beside the dome laid bare by erosion that constitutes the object of our present approach, we shall mention one more such form of relief that we shall deal with in one of our future researches – the Depression of Vulcana, one of the largest anticline depressions in the Subcarpathians of Romania – 40 km².

2. Setting
The anticline of Vâscea (fig. 1) is situated in the north-west of the Subcarpathians of Ialomiţa, at the altitude of 750m. The torrent of Vâscea, which drains it, is a tributary on the left side of Ialomicioara River. It is situated north of the locality of Runcu.

3. Localization within the main morphostructural Subcarpathian alignments
The dome laid bare by erosion is situated in the internal Carpathian flysch, of Cretaceous age. Structurally, it is situated in the axis of the marginal anticline of Cetăţeni-Pucheni-Brebu-Moroeni. From a petrografic viewpoint, there are argillaceous-marly schists (layers of Comarnic, of Barremian-Aptian age) framed by the tougher rocks of the Turonian-Sinionian (marls, grit stones and microconglomerates).

4. Morphometry
Dimensions – 2.2 km long, 1.2 km wide, 1.9 km² in point of area. The anticline of Vâscea is situated at a maximum altitude of 890 m, a minimum altitude of 610 m and an average altitude of 750 m. Its relief energy is of 280 m, and its average slope is of 127.2 m/km.

Fig. 1. The Vâscea relief inversion

5. Morphogenetic mechanisms

Following the long period of post-uplifting evolution (about 130 million years), this area has been submitted to an intense subaerial erosion. After the initial position given by tectonics – there was a Subcarpathian Hill here – the Hill of Vâscea – then came into interaction the second element of the structure-petrography system, namely the rock. So, the soft rocks, but uplifted more, belonging to the Barremian-Aptian (argillaceous-marly schists) were more strongly attacked, and answered faster to the erosion exerted by the external agents than the tougher rocks of the Turonian-Sinonian (marls, grit stones and microconglomerates), situated respectively in the north and in the south, in the axis of some synclinal folds which functioned as depressions. In time, the ratio structure / petrography was reversed in favor of the petrography, through the appearance of the inversion relief.
In point of the morphogenetic evolution, the rock is the element that will have a determining role, imposing its influence over the initial morphostructural state. This structure / petrography ratio, which we mentioned in the beginning as well, is therefore a significant indicator in the evaluation of the evolutorial stage of the Subcarpathian relief.

During the very long period of time that followed the uplifting, we can appreciate that a crucial role in the emptying of the initial anticline hill went successively to intense fragmentation and alteration processes, the carrying away of the materials by gravitation and through transport, and in-depth erosion. During the Quaternary, we should mention the significant role played in the carving of the dome by the massive post-glacial landslides.

6. Actual relief modeling processes
The superficial erosions should be mentioned with a secondary role, especially where the forest is missing. The gravitational movements are much more important. Landfalls are predominant in the upper third of the dome’s slopes, having an active role in the withdrawal of the two cuestas situated in front of each other; the dominant form of movement is by rolling. Landslides are prominent in the middle and lower third of the slopes; massive landslides occur in the center of the depression and superficial ones for the rest of it. Mud flows have been identified along two main alignments, in the southwest of the anticline; their length can reach up to 0.5 km. Streaming and torrential erosion have the most important role in the increase of in-depth fragmentation and in the transport of the materials carried away from the slopes. Drainage trenches can be found on the sides of the gullies, torrents and in the precipices triggered by landslides and on the slopes of the cuestas affected by landslides. The ravines are less numerous; they are present in the center and can be up to 0.75 km long. In the north of the depression there is a gully of significant dimensions 2 km long and up to 50 m wide (fig. 2). In the south can be found the main drainage artery of the dome of Văsce – the torrent bearing the same name; dimensions: 2 km long, 400 m wide in the area of the hydrographic basin that receives it. In the point where it pours its waters into Ialomicioara River, it has developed a dejection cone of 250/300 m, which has led to a slight deviation to the right (westwards) of the course of the valley that gathers its waters.

6. Tendencies of evolution
They encompass three main directions: the increase in dimensions of the small torrential basin and the transformation of the gully into torrent; the transformation of the landslides into mud flows; the decrease of the size of the landfalls and their transformation into alignments of land flows and mud flows. As a whole, one can notice the tendency of increase of the dome’s area laid bare by erosion.

References
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